

CLAIMS

I Claim:

1 1. An authoring tool that assists an author in building an automated
2 troubleshooter for a product, the authoring tool comprising:

3 a cause editor interface that allows an author to place, in a cause data
4 structure, information pertaining to causes of malfunction of the product;

5 an action editor interface that allows an author to place, in an action
6 data structure, information pertaining to actions that can be taken to correct
7 malfunction of the product; and

8 a question editor interface that allows an author to place, in a question
9 data structure, information pertaining to questions that can be asked a user
10 of the product to help identify causes of malfunction of the product.

1 2. An authoring tool as in claim 1 wherein the authoring tool
2 additionally comprises a library of modules, at least one of the modules
3 containing troubleshooting information about a component of the product.

1 3. An authoring tool as in claim 2 wherein the author can save the
2 library of modules to a disk storage device, load the library of modules from
3 the disk storage device and create a new library of modules.

1 4. An authoring tool as in claim 2 wherein the author can select
2 modules from the library of modules when building the automated
3 troubleshooter for the product.

1 5. An authoring tool as in claim 4 wherein the author can create new
2 modules and delete modules.

1 6. An authoring tool as in claim 5 wherein the author can rename
2 modules and import modules from other libraries of modules.

1 7. An authoring tool as in claim 1 wherein information pertaining to a
2 cause relates to the following categories:

3 name of the cause;
4 parent of the cause;
5 explanation of the cause; and,
6 probability of the cause being source of malfunction.

1 8. An authoring tool as in claim 7 wherein the information pertaining
2 to the cause additionally relates to the following categories:
3 category of the cause;
4 dependency on environment; and,
5 indication that a customer is not to access information pertaining to the
6 cause.

1 9. An authoring tool as in claim 1 wherein information pertaining to
2 an action relates to the following categories:

3 name of the action;
4 explanation of the action;
5 causes solved by the action;

6 probabilities that the action solves specified causes
7 an indication whether the action is for information-gathering or is a
8 potential solution;
9 costs of taking the action; and,
10 trustworthiness of an answer to the action.

1 10. An authoring tool as in claim 9 wherein the information pertaining
2 to the action additionally relates to the following categories:

3 an indication as to whether the action should be taken before other
4 actions;
5 an indication as to whether the action is a workaround;
6 additional actions included with the action;
7 whether the action can only be performed after a specified question has
8 been answered; and,
9 whether the action cannot be performed after a specified question has
10 been answered.

1 11. An authoring tool as in claim 1 wherein information pertaining to a
2 question relates to the following categories:

3 name of the question;
4 explanation of the question;
5 number of answers;
6 names of answers;
7 costs of finding an answer to the question; and,
8 trustworthiness of the answer to the question.

1 12. An authoring tool as in claim 11 wherein the information
2 pertaining to the question additionally relates to the following categories:
3 whether the question can only be performed after a specified question
4 has been answered;
5 whether the question cannot be performed after a specified question
6 has been answered;
7 an indication as to whether the question should be asked before other
8 questions; and,
9 whether the question is a symptom question or a general question.

1 13. An authoring tool as in claim 11 wherein information pertaining to
2 the question particularly pertains to a symptom question and additionally
3 relates to the following categories:
4 causes of a symptom;
5 probability of answers to the question conditional on causes that can
6 cause the symptom; and,
7 probability of answers to the question conditional on no causes that can
8 cause the symptom.

1 14. An authoring tool as in claim 11 wherein information pertaining to
2 the question particularly pertains to a general question and additionally
3 relates to the following categories:
4 prior probabilities of answers to the question;
5 causes that are affected by answers to the question; and,

probability of the affected causes conditional on each answer to the question.

15. An authoring tool as in claim 1 wherein:
the cause editor interface additionally allows an author to create new cause entries;
the action editor interface additionally allows an author to create new action entries; and
the question editor interface additionally allows an author to create new question entries.

16. An authoring tool as in claim 1 wherein:
the cause editor interface additionally allows an author to edit existing cause entries;
the action editor interface additionally allows an author to edit existing action entries; and
the question editor interface additionally allows an author to edit existing question entries.

17. An authoring tool as in claim 1 wherein:
the cause editor interface additionally allows an author to delete existing cause entries;
the action editor interface additionally allows an author to delete existing action entries; and

6 the question editor interface additionally allows an author to delete
7 existing question entries.

1 18. An authoring tool that assists an author in building an automated
2 troubleshooter for a product, the authoring tool comprising:

3 a cause editor interface that allows an author to place, in a cause data
4 structure, information pertaining to causes of malfunction of the product,
5 wherein for a cause the information relates to the following categories:

6 name of the cause,

7 parent of the cause,

8 explanation of the cause, and

9 probability of the cause being source of malfunction.

1 19. An authoring tool as in claim 18 wherein the information
2 pertaining to the cause additionally relates to the following categories:

3 cause category,

4 dependency on environment, and

5 indication that a customer is not to access the information pertaining to
6 the cause.

1 20. An authoring tool that assists an author in building an automated
2 troubleshooter for a product, the authoring tool comprising:

3 an action editor interface that allows an author to place, in an action
4 data structure, information pertaining to actions that can be taken to correct

malfunction of the product, wherein for an action the information relates to the following categories:

name of the action,
 explanation of the action,
 causes solved by the action,
 probabilities that the action solves specified causes,
 an indication whether the action is for information-gathering or is a potential solution,
 costs of taking the action, and
 trustworthiness of an answer to the action,

21. An authoring tool as in claim 20 wherein the information pertaining to the action additionally relates to the following categories:

an indication as to whether the action should be taken before other actions,
 an indication as to whether the action is a workaround;
 additional actions included with the action,
 whether the action can only be performed after a specified question has been answered, and
 whether the action cannot be performed after a specified question has been answered.

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 21. An authoring tool that assists an author in building an automated troubleshooter for a product, the authoring tool comprising:

3 a question editor interface that allows an author to place, in a question
4 data structure, information pertaining to questions that can be asked a user
5 of the product to help identify causes of malfunction of the product, wherein
6 for a question the information relates to the following categories:

7 name of the question,
8 explanation of the question,
9 number of answers,
10 names of answers,
11 costs of finding an answer to the question, and
12 trustworthiness of an answer to the question.

1 23. An authoring tool as in claim 22 wherein the information
2 pertaining to the question additionally relates to the following categories:
3 whether the question can only be performed after a specified question
4 has been answered;
5 whether the question cannot be performed after a specified question
6 has been answered;
7 an indication as to whether the question should be taken before other
8 questions; and,
9 whether the question is a symptom question or a general question.

1 24. An authoring tool as in claim 22 wherein information pertaining to
2 the question particularly pertains to a symptom question and additionally
3 relates to the following categories:
4 causes of a symptom;

5 probability of answers to the question conditional on causes that can
6 cause the symptom; and,
7 probability of answers to the question conditional on no causes that can
8 cause the symptom.

1 25. An authoring tool as in claim 22 wherein information pertaining to
2 the question particularly pertains to a general question and additionally
3 relates to the following categories:

4 prior probabilities of answers to a question;
5 causes that are affected by answers to the question; and,
6 probability of the affected causes conditional on each answer to the
7 question.

1 26. An authoring tool that assists an author in building an automated
2 troubleshooter for a product, the authoring tool comprising:

3 a troubleshooter model editor interface that allows the author to place
4 in a troubleshooter model structure, information pertaining to malfunction of
5 the product; and,

6 a library module editor interface that allows the author to place in a
7 library data structure information pertaining to modules corresponding with
8 components of the product.

1 27. An authoring tool as in claim 26 wherein the information
2 pertaining to modules corresponding with components of the product
3 comprises:

4 name of a component of a module;
5 causes of the component malfunctioning;
6 actions that can resolve malfunctioning of the component; and,
7 questions that can provide information about the causes of the
8 component malfunctioning.

1 28. An authoring tool as in claim 26 wherein the information
2 pertaining to malfunction of the product comprises:
3 name of a problem;
4 causes of the problem;
5 actions that can help resolve the problem;
6 questions that can provide information about the problem; and,
7 an amount of time required to observe whether the problem is present.

1 29. An authoring tool as in claim 26 wherein the author can create a
2 new troubleshooter model, load troubleshooter models from disk storage, save
3 the troubleshooter models to the disk storage such that the troubleshooter
4 models can be run by external troubleshooter software, save the
5 troubleshooter models in text format, and print a troubleshooter model in text
6 format.

1 30. An authoring tool as in claim 26 wherein the author can export
2 causes, actions and questions from a current troubleshooter model to a
3 current library module, and export causes, actions and quests form the
4 current library module to the current troubleshooter model.

33. An authoring tool as in claim 26 wherein the author can view causes in a tree structure, specify sets of probabilities for each level of causes in the tree structure, and normalize the probabilities on each level of causes in the tree structure.